

# JAPAN

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JIS T 9241-2 (2008) (English): Hoists for the transfer of persons with disabilities -- Part 2: Mobile hoist

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ISO INSIDE  
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*The citizens of a nation must  
honor the laws of the land.*

Fukuzawa Yukichi

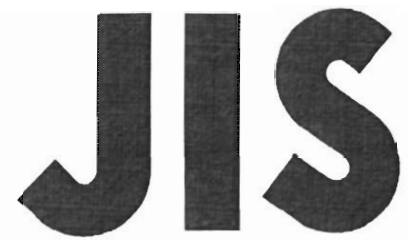
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JAPANESE  
INDUSTRIAL  
STANDARD

Translated and Published by  
Japanese Standards Association

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JIS T 9241-2 : 2008

**Hoists for the transfer of persons with  
disabilities — Part 2: Mobile hoist**

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## Foreword

This translation has been made based on the original Japanese Industrial Standard established by the Minister of Economy, Trade and Industry, through deliberations at the Japanese Industrial Standards Committee in accordance with the Industrial Standardization Law.

This JIS document is protected by the Copyright Law.

Attention is drawn to the possibility that some parts of this Standard may conflict with a patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have technical properties. The relevant Minister and the Japanese Industrial Standards Committee are not responsible for identifying the patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have the said technical properties.

JIS T 9241 consists of the following 5 parts under the general title “*Hoists for the transfer of persons with disabilities*”:

*Part 1 : Classification and general requirement*

*Part 2 : Mobile hoist*

*Part 3 : Stationary hoists*

*Part 4 : Rail guide hoists*

*Part 5 : Sling Sheets*

# Hoists for the transfer of persons with disabilities—

## Part 2 : Mobile hoist

### Introduction

This Japanese Industrial Standard has been prepared based on the first edition of ISO 10535 published in 1998 dividing into parts by classification of products and with some modifications of the technical contents to reflect domestic situation.

The portions given continuous sidelines or dotted underlines are the matters not stated in the original International Standard. A list of modifications with the explanation is given in Annex JA.

### 1 Scope

This Standard specifies the mobile hoists which are a type of hoists used for the persons unable to easily transfer or move on their own (hereafter referred to as “hoists”).

NOTE : The International Standard corresponding to this Standard is as follows.

ISO 10535:1998    *Hoists for the transfer of disabled persons—Requirements and test methods* (MOD)

In addition, symbols, which denote the degree of correspondence in the contents between the relevant International Standard and JIS, are IDT (identical), MOD (modified), and NEQ (not equivalent) according to ISO/IEC Guide 21.

### 2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. The most recent editions of the standards (including amendments) indicated below shall be applied.

JIS B 8360	<i>Wire reinforced rubber hose assemblies for hydraulic use</i>
JIS B 8361	<i>Hydraulic fluid power—General rules relating to systems</i>
JIS B 8364	<i>Textile reinforced rubber hose assemblies for hydraulic use</i>
JIS B 8370	<i>Pneumatic fluid power—General rules relating to systems</i>
JIS C 1509-1	<i>Electroacoustics—Sound level meters—Part 1: Specifications</i>
JIS C 9730-1	<i>Automatic electrical controls for household and similar use—Part 1: General requirements</i>
JIS T 9241-1	<i>Hoists for the transfer of persons with disabilities—Part 1: Classification and general requirement</i>
JIS Z 8703	<i>Standard atmospheric conditions for testing</i>



### 3 Terms and definitions

For the purposes of this Standard, the terms and definitions given in JIS T 9241-1 and the following terms and definitions apply:

#### 3.1 mobile hoist

a hoist fitted with a device or devices (e.g. wheels) that is freely movable and propellable along the floor, and with which a lifted person is lifted, transferred or moved (see figure 1)

#### 3.2 attendant

the person who operates the hoist to transfer or move the lifted person

#### 3.3 backrest

the part of the body-support unit that supports the back of the person being lifted, moved or transferred (e.g. sling, seat, stretcher, etc.) along with the associated attachment construction

#### 3.4 backwards

180° to the forwards direction of travel

#### 3.5 body-support unit

the part of the hoist that supports the person being lifted, moved or transferred (e.g. sling, seat, stretcher, etc.) along with the associated attachment construction

#### 3.6 central suspension point (CSP)

a reference point on the hoist to be used for measurements (this point may be a connecting point)

#### 3.7 connecting point

the part to which the body-support unit attaches

#### 3.8 control devices

the part or parts of the hoist which operates the lifting and lowering mechanisms of the CSP as well as other functions

#### 3.9 end limiting device

a device that stops any movement at a predetermined end position

#### 3.10 flexible device

a component of the lifting device which connects the spreader bar with the component that functions as a lifting device (e.g. chain, tape, rope)

#### 3.11 free wheeling

the mechanism to transmit only a force in one way direction and to spin free in the reverse rotation, like a rear wheel of bicycles

**3.12 forwards**

the intended direction of travel, as stated by the manufacturer, in relation to the person who is moving the hoist

**3.13 functional test**

the test to confirm that the corresponding mechanism and construction meet the requirements specified in clause 5, by means of operating, etc.

**3.14 hoisting range**

the vertical distance between the maximum and minimum heights of the CSP

**3.15 hoisting reach**

the unimpeded horizontal distance between the post and a vertical line passing through the CSP at a given height within the hoisting range (see figure 1)

**3.16 hold to run control device**

control device which initiates and maintains the operation of the hoist element only as long as the manual control is actuated

The manual control automatically returns to the “stop” or “off” position when released.

**3.17 lifted person**

the person who is transferred by the hoist

**3.18 lifting cycle**

the raising and lowering of the lifting machinery for the same distance in both directions

**3.19 lifting device**

means of lifting and lowering the body-support unit

**3.20 lifting machinery**

device that performs the lifting function

**3.21 maximum load**

the greatest permissible load, including the lifted person, the body-support unit, etc. that can be applied to the hoist

**3.22 adverse condition**

the condition in which failure is most likely to occur

**3.23 sling**

the body-support unit manufactured from such soft cloth that fits the body and to be attached to the lifting device of the hoist

**3.24 rigid body-support unit**

a preformed seat or recumbent device, manufactured from rigid materials (if necessary padded), or flexible materials encased by a frame, with associated connecting means for attaching to the lifting device or hoist

### 3.25 single fault condition

condition in which a single means for protection against a safety hazard in equipment is defective or a single external abnormal condition <sup>1)</sup> is present

Note <sup>1)</sup> For example, electric power failure is supposed.

### 3.26 sitting part

part of the body-support unit that is available for sitting on

### 3.27 spreader bar

a rigid construction with more than one connection point, onto which the body-support unit is attached

### 3.28 turning diameter

the diameter of the minimum circle drawn by the outermost part of hoist, when it is turned 360° in the same direction

### 3.29 hoists trolley

a type of mobile hoist that is freely movable and propellable along the floor and that mounts a stretcher on which a lifted person is held, transferred or moved

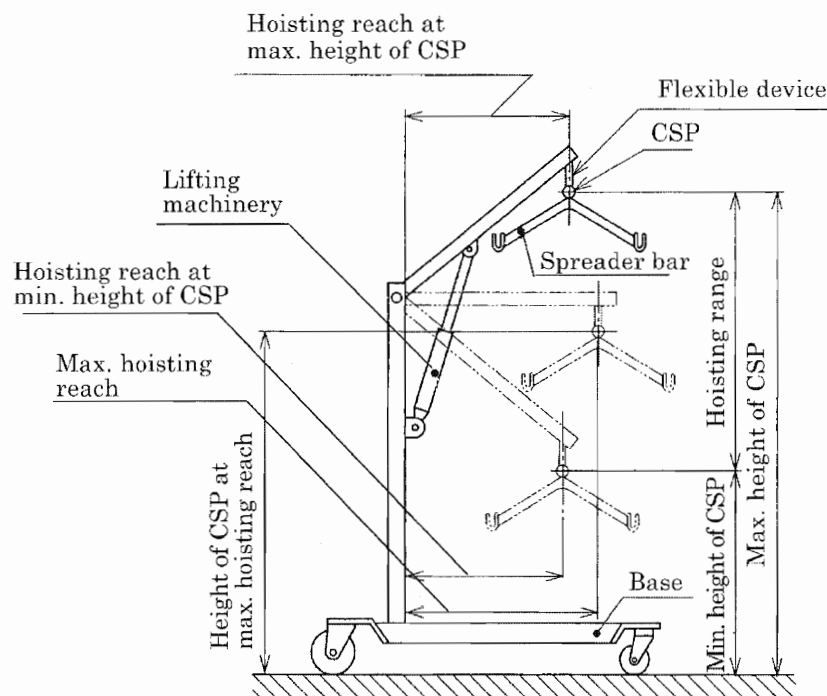


Figure 1 Mobile hoist (Hoisting range/reach)

## 4 Classification and division

### 4.1 Classification

The classification of mobile hoists shall be as given in 4.1.1 of JIS T 9241-1.

### 4.2 Division (symbol for division) according to maximum load

The division (symbol for division) according to the maximum load shall be as given in 4.2 of JIS T 9241-1.

## 5 Design, appearance and construction

### 5.1 Design

#### 5.1.1 Risk analysis

The risk analysis shall be as given in 5.2.1 of JIS 9241-1.

#### 5.1.2 Ergonomics factors

The ergonomics factors of mobile hoists shall be as given in 5.2.2 of JIS 9241-1.

### 5.2 Appearance

The appearance shall be as follows.

- a) For hoists, all accessible edges, corners and surfaces shall be smooth and have no burrs or sharp edges.
- b) If coated, the surface shall be smooth and free from noticeable holes or bubbles.

### 5.3 Construction

The construction of mobile hoist shall be as given in 5.3 of JIS 9241-1, and as follows.

- a) All load-bearing fasteners shall be either self-locking or fitted with a locking device to prevent inadvertent detachment.
- b) Single use components (e.g. self-tapping screws) shall not be used to secure any component that can be deemed to be load-bearing. In addition, they shall not be used for the assembly of any component(s) that is intended to be removed for the purpose of dismantling for transport or storage.
- c) All projections shall be avoided or fitted with adequate protection, such as covers and cushions to prevent damage or injury (e.g. shearing or crushing).
- d) The hoist shall include in its design some means (e.g. limiting switches, the principal of free-wheeling, etc.) that will ensure that, when lowering, should the body-support unit, spreader bar or lifting arm come into contact with the lifted person, the total load imposed on the lifted person shall not be greater than the total mass of any of those parts. When operated, these means shall not allow the hoist to face unsafe conditions such as falling off of the lifting arm.
- e) All control devices, for lowering or raising the lifted person, shall be easily accessible and operable by the person operating the hoist.

- f) Electrically operated hoists shall be provided with an emergency device which is readily accessible and is wired to isolate the power supply and to stop any electrically produced mechanical movement which could cause a safety hazard.
- g) All control devices shall be of the 'hold to run' type.
- h) Hoists shall be provided with a safety device that ensures that the lifted person does not fall in the event of a single-fault condition of the lifting machinery.
- i) The connection point(s) shall be smooth thus avoiding excessive wear of any connectors.
- j) All hoists shall be provided with an emergency lowering device.  
 NOTE : The emergency lowering device is a safety device which ensures to lower the lifted person in an emergency.
- k) Hoists with hydraulic system or pneumatic system shall be as specified in Annex A.
- l) The hoist shall be designed for the purpose of transferring a lifted person according to the field of application, as stated by the manufacturer (see Annex C) and it shall be able to be operated by one person. If not, this shall be stated in the instructions for use.
- m) On all battery-powered hoists, a warning device(s) shall be provided that will indicate when the battery or batteries require charging. Once this device starts operating, the sufficient power shall be available to complete one (1) full lifting cycle with the maximum load.
- n) Any hoist shall be so designed that it shall not operate if the load of more than 1.5 times the maximum load is applied.
- o) The CSP shall be so designed that the spreader bar does not fall during the normal operation
- p) When the width of the spreader bar is adjustable during use, a safety device shall be provided to prevent the spreader bar from falling.
- q) Brake(s) shall be provided on any mobile hoists.

## 6 Performance

### 6.1 General requirements

General requirements are as follows.

- a) Electrically operated hoists shall conform to clauses 8, 9 and 13 of JIS C 9730-1 regarding electrical safety.
- b) The electromagnetic compatibility of electrically operated hoists shall conform to clauses 23 and 26 of JIS C 9730-1.
- c) After the static test, in accordance with 7.2.1 a), any flexible lifting devices such as tape, rope or chain, associated lifting joints and hinge connections shall show no sign of damage that will affect the function of the hoist as stated by the manufacturer.

- d) A handgrip, if any, shall not be detached when tested according to 7.2.1 b).
- e) The CSP shall have a stopping distance of not more than 50 mm when tested according to 7.2.1 c).

## 6.2 Rate (velocity) of lifting and lowering

The rate of lifting and lowering shall be as follows.

- a) The rate of lowering shall not exceed 0.15 m/s when loaded with the maximum load after tested according to 7.2.2 a).
- b) The rate of raising or lowering shall not exceed 0.25 m/s when unloaded after tested according to 7.2.2 b).

## 6.3 Operating forces

The operating forces required for those parts of the hoist that are designed to be operated by fingers, hands or feet shall not exceed the following values after tested according to 7.2.3.

- a) Operation by using a finger    5 N
- b) Operation by using a hand    105 N
- c) Operation by using a foot    300 N
- d) Operation by a turning    1.9 Nm

## 6.4 Durability

After tested according to 7.2.4, the hoist shall show no signs of permanent deformation or wear that may affect its function.

## 6.5 Static strength

After tested according to 7.2.5, the hoist shall show no signs of deformation or damage that may affect its function.

## 6.6 Static stability

After tested according to 7.2.6, the hoist shall not lose its equilibrium (balance) at the following angles:

- a) 10° for the forward and backward inclinations with the chassis in the intended travelling position.
- b) 7° for the forward and backward inclinations with the chassis in the adverse condition.
- c) 5° for any other directional inclination.

## 6.7 Immobilizing device (brakes)

When tested in accordance with 7.2.7, a maximum movement of 10 mm is allowed in any direction.

## 6.8 Operating forces required for moving the hoist

When tested in accordance with 7.2.8, the initial resistance value of the hoist (at the time of travelling and turning) shall not exceed 160 N.

## 6.9 Sound level

When tested in accordance with the method of 7.2.9, the hoist shall have the maximum sound level not exceeding 65 dB.

# 7 Test methods

## 7.1 General

### 7.1.1 Test conditions

The hoist shall be tested as it is delivered to the customer. However, if the hoist is of a multi-functional design and can be assembled in different formats, it shall be assembled according to the instructions supplied by the manufacturer. If the hoist is intended to be used in different combinations, then all combinations shall be tested in the most adverse condition. The tests shall be carried out under normal indoors conditions <sup>2)</sup>. All tests shall be carried out in the order stated.

Note <sup>2)</sup> The temperature of  $(20 \pm 15) ^\circ\text{C}$  and relative humidity of  $(65 \pm 20) \%$  are specified in JIS Z 8703.

The test report referred to in 7.1.4 shall be placed in the manufacturer's technical file.

### 7.1.2 Test equipment

The test equipment shall be as follows:

- a) When a cylindrical load is required, it shall be made of steel, with rounded edges (not less than  $R\ 25$ ) and diameter of 350 mm. For the testing of sling, the load can be used to represent the proposed body to be lifted.
- b) The simulated testing equipment shall be capable of simulating use in practice (e.g. test fingers).
- c) The strength testing equipment shall be capable of applying loads with negligible dynamic factor.

### 7.1.3 Tolerances of test equipment

For the test equipment, the following tolerances on measurements apply.

- a) Force/Loads  $\pm 5 \%$
- b) Velocity  $\pm 5 \%$
- c) Angle  $\pm 0.25^\circ$
- d) Length  $\pm 0.5\text{ mm}$  for  $\leq 150\text{ mm}$   
 $\pm 5.0\text{ mm}$  for  $> 150\text{ mm}$
- e) Time  $\pm 0.1\text{ s}$

#### 7.1.4 Test report

The test report shall include at least the following information:

- a) A description of the product, including type and designation;
- b) Name and address of the manufacturer;
- c) A photograph of the hoist equipment as presented during test;
- d) Name and address of the testing laboratory;
- e) The stability values to the nearest 0.5° rounded downwards;
- f) Result of tests including record of maintenance, if any;
- g) Any deviations from the standardized test procedure;
- h) Date of test.

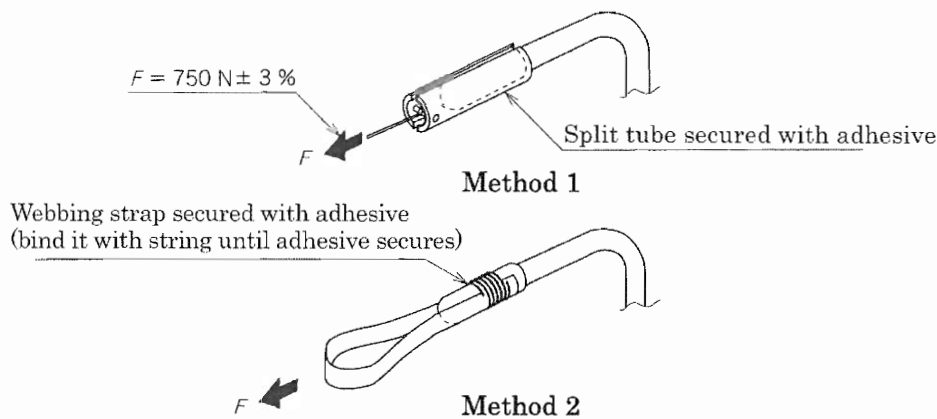
#### 7.2 Test methods for performance

##### 7.2.1 General requirements

The performance shall be confirmed according to the following procedure.

- a) For the flexible devices including tapes, wires or chains, and their joints used for lifting, statically apply 6 times the maximum load for 20 min. For the hinge parts, statically apply 4 times the maximum load for 20 min. Then, check the results by visual inspection.
- b) The performance of handgrips shall be confirmed according to the following procedure.
  - 1) Placing the hoist on a flat test plane, prepare the test using one of the two methods shown in figure 2.
  - 2) Fix the hoist so as not to incline or move.
  - 3) The handle may be supported, if necessary, so as not to bend due to the test load.
  - 4) When the hoist is moved, apply the load to each handgrip in the pushing direction until it reaches a maximum of 750 N, through pushing the hoist.
    - Maintain the load for 10 s.
    - Remove the load.
  - 5) When the hoist is moved, apply the force in the pulling direction and repeat the procedures from 1) to 4) above, if the handgrips are pulled out by pulling the hoist.





**Figure 2 Loading method for handgrip**

c) The test for the CSP shall be carried out according to the following procedure.

For the hoists trolley, the "CSP" may be arbitrarily set.

- 1) Load the hoist with the maximum load
- 2) Set the CSP to the top position
- 3) Lower the CSP at the full speed
- 4) When the CSP is lowered to the middle of lifting range, remove the energy source from the hoist to cease (e.g. by releasing the relevant control button, closing the relevant hydraulic valve(s) or ceasing to wind manually).
- 5) Measure the vertical distance from the point where the energy source has been ceased to the point where the lowering has stopped actually.

#### 7.2.2 Test methods for rate (velocity) of lifting and lowering

The test method of rate of lifting and lowering shall be as follows.

- a) Lowering the hoist with loaded with the maximum load, measure the lowering rate at the middle of lifting range.
- b) Lifting and lowering the hoist with unloaded, measure each lifting and lowering rate at the middle of lifting range.

#### 7.2.3 Test methods for operating forces

With the hoist loaded with the maximum load, measure the operating forces of all control devices of the hoist. These measurements shall be taken according to the methods specified by the manufacturer.

#### 7.2.4 Test methods for durability

The test method of durability shall be as follows.

- a) Place the hoist on a horizontal surface with the base locked in the adverse condition (the weakest strength condition). The hoist shall be secured against moving on the surface.
- b) For manually operated hydraulic hoists, the stroke of the pump lever shall be as long as possible and constant.
- c) The working/pause ratio (duty cycle) during the test shall be 15/85.
- d) If necessary, it is permissible to use an alternative power supply instead of the battery.
- e) Position the load on the hoist as shown in figure 4. Raise and lower the hoist by 250 mm or 25 % of the vertical movement, whichever is the greater, in the middle of the lifting range. Ensure that the pause in the lifting cycle and the loading and unloading is carried out when the hoist is at the lowest position of the lifting cycle.
- f) Repeat the lifting cycle of hoist for 10 000 times in total, according to the following procedure.
  - 1) 1 000 lifting cycles with the maximum load according to e) at the lower-end of the lifting range of the hoist. For electrical hoists, activate the lower end limiting device in every cycle.
  - 2) 1 000 lifting cycles with 80 % or over of the maximum load according to e) at the top of the lifting range of the hoist. For electrical hoists, activate the top-end limiting device in every cycle.
  - 3) 3 000 lifting cycles with 80 % or over of the maximum load according to e) in the middle of the lifting range of the hoist.
  - 4) 5 000 lifting cycles with 60 % or over of the maximum load according to e) in the middle of the lifting range of the hoist.
- g) During the lifting cycle, vertical swing of the load may be adjusted in such a way that the swing induces only a negligible dynamic element.

#### 7.2.5 Test methods for static strength

The hoist shall be loaded statically according to the following procedure. Place the hoist on an inclined surface [see a)] to secure against tipping (figure 3) but not against deformation. The lifting boom/actuator shall be set in the adverse condition.

- a) Load the hoist with 1.25 times the maximum load for 5 min in each of following three directions.
  - 1) 10° forwards on the level
  - 2) 10° backwards on the level
  - 3) 5° sideways on the level, in the most adverse direction (both left and right sides where applicable)

- b) The test is performed with the surface horizontal and with 1.5 times the maximum load applied for 20 min.

#### 7.2.6 Test methods for static stability

The test shall be conducted according to the following procedures with the chassis in the travelling position, and then with the load placed in the adverse condition for the caster and chassis.

##### a) Unloaded

The test when the hoist is unload shall be conducted as follows.

- 1) Position the unloaded hoist on the test surface with the wheels in contact with the stopper(s) (see figure 3).
- 2) Incline the test plane gradually until the hoist loses its equilibrium (balance). Record the angle of inclination.
- 3) Repeat the test in the backward and sideways directions.

##### b) Loaded

The test when the hoist is loaded shall be conducted as follows.

- 1) Apply the maximum load as follows.

The load shall be applied in the adverse condition.

- For the hoist with the sling, the load to the hoist's CSP is applied in such a way that the load is allowed to move freely.

Set the central suspension point (CSP) at the position under the adverse condition.

- For the hoist with the rigid body-support unit, the centre of gravity of the load is placed in relation to the backrest according to figure 4 (within 350 mm from the front-end of seat).
  - For the hoists trolley, the load is applied as shown in figure 5.
- 2) With the hoist loaded, repeat the same procedure as for the unloaded hoist, and determine the inclined angle at which the hoist falls down.

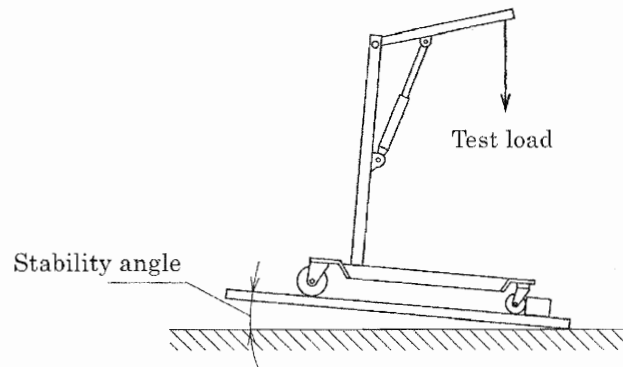


Figure 3 Example of static strength test and forward stability test

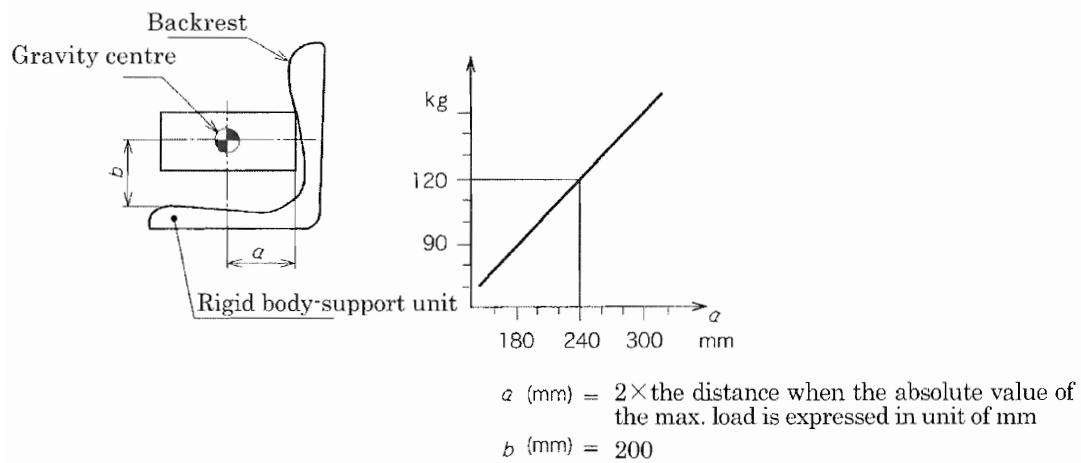


Figure 4 Placing of loads on rigid body supports

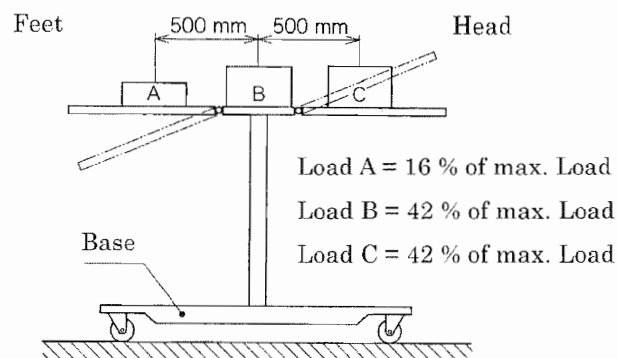


Figure 5 Placing of loads on hoists trolley

### 7.2.7 Test methods for immobilizing device (brakes)

Position the hoist on a slope with 1° or over inclination with the immobilizing device activated. Apply the maximum load statically on the hoist in the position under the adverse condition (regarding the direction of casters).

### 7.2.8 Test methods for moving forces

The test shall be carried out on a flat, smooth and horizontal steel plate. Apply the maximum load on the hoist with the lifting arm set to obtain the maximum reach. Set the castors at 180° to the direction of pulling/pushing (to stabilize the casters). Gradually apply the force to the push handle, and measure the force by which the hoist begins to move using a dynamometer. Repeat five (5) times. The highest value noted during these tests shall be recorded as the starting force. The starting force shall be applied and recorded as follows.

- a) In the forward direction
- b) In the backward direction
- c) In the direction that begins to turn the hoist

### 7.2.9 Test method for sound level

Apply the maximum load to the hoist at the position that is horizontally 1 m away from the lifting device and 1 m high, and measure the sound level during 1 lifting cycle using a sound level meter specified in JIS C 1509-1.

## 8 Inspection

Inspection of the hoist is divided into type inspection<sup>3)</sup> and delivery inspection<sup>4)</sup>. The respective inspection items are as follows.

The method of sampling inspection for the both inspections shall be upon the agreement between the purchaser and the manufacturer.

Notes <sup>3)</sup> Type inspection is intended to judge whether the products conform to all characteristics specified in the design.

<sup>4)</sup> Delivery inspection is intended to judge whether the products conform to the required characteristics in the case of delivery of the products that have been designed and manufactured in the same way as the products having already passed the type inspection.

- a) Items for type inspection
  - 1) Appearance
  - 2) Construction
  - 3) Performance
- b) Items for delivery inspection
  - 1) Appearance

## 9 Marking and instruction for use

### 9.1 Marking

All operating controls shall be marked for their intended function. Every hoist (and any main part of a multi-purpose hoist) shall be permanently marked with the following information as a minimum:

- a) Name and address of the manufacturer
- b) Number of this Standard, classification and symbol for division  
Example 1 **JIS T 9241-2 : Mobile hoist—WM**
- c) Model definition (model and symbol/number specified by manufacturers)
- d) Lot or batch and/or serial number
- e) Year and month of manufacture or their abbreviation
- f) Electrical details (voltage and power consumption or consumption current)
- g) Details of any other energy source (e.g. hydraulic/pneumatic system)
- h) Maximum load

Example 2 Maximum load : 75 kg (including lifted person, body-support unit and others)

Example 3 Maximum load : 75 kg (including fixed body-support unit (5 kg), lifted person and others)

- i) For removable spreader bar, maximum load which the spreader bar can sling

### 9.2 Instruction for use

The instruction for use shall contain the following information.

- a) Name, address, telephone number and facsimile number of the manufacturer, supplier or agent if different
- b) How to operate, install and assemble
- c) Intended use of the hoist (see Annex C);
- d) Periodical inspection cycle, cleaning method and maintenance information (see Annex B)
- e) Details for trouble shooting/assistance
- f) Information on the sling suitable for the spreader bar, if any
- g) Technical specifications
  - 1) Dimensions (including the following)
    - Base height specified in figure 6
    - Max./Min. and internal/external base width specified in figures 7 and 8
    - Base clearance specified in figure 6

- Max./Min. hoisting reach (see figure 1)
- Hoisting range at the hoist height shown in figure 1
- Turning diameter (excluding the spreader bar)

2) Maximum load

3) Safety precautions

Example 1    The maximum load includes the mass of body-support unit and devices attached along with the lifted person, etc. and shall not be exceeded in use.

- 4) Total weight of the unloaded hoist or the weights of any main parts that can be dismantled where appropriate (e.g. for transportation)
- Total mass of hoist excluding body-support unit (if the rigid body-support unit is integrated into the hoist, the mass of it will be included.)
  - Number of parts and name of each parts, if dismantled
  - Mass of the heaviest parts
- h) Electrical information (voltage and power consumption or consumption current)
- i) Acceptable accuracy of measuring device (e.g. weighing scale) and operating instructions for the products with “Warning” or “Attention” marks
- j) List of spare parts
- k) Description of warning or attention for encouraging to surely refer to the instruction for use of the sling to be used
- l) List of daily inspection items
- m) With or without waterproof property for electric components such as an operation device

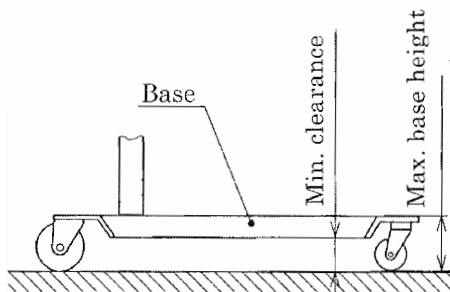


Figure 6 Base height/clearance

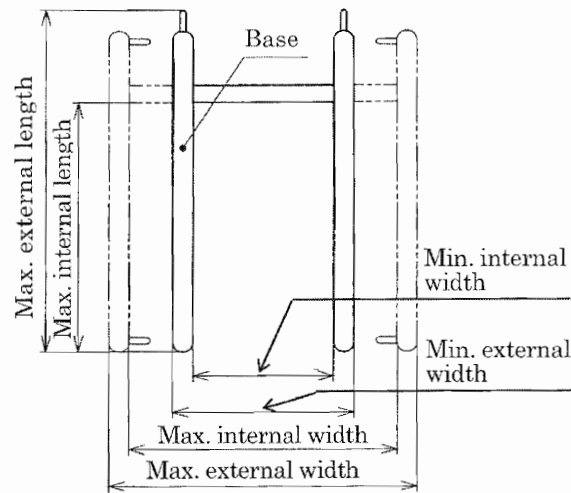


Figure 7 Base width (Parallel type)

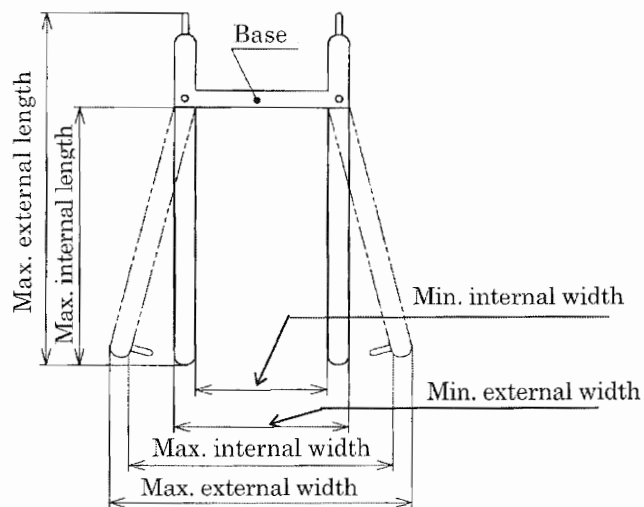


Figure 8 Base width (Radial type)



## Annex A (normative)

### Hydraulic and pneumatic components—requirements

#### Introduction

This Annex specifies requirements for hydraulic and pneumatic components, if they are used in hoists.

#### A.1 Hydraulic components

A.1.1 Hydraulic actuators (including hoses, pipes, connectors and other components on the pressure side) shall be taken account so as to withstand all loads occurring through pressure. In addition, they shall be compatible with the hydraulic fluid (a fluid used in the hydraulic equipment or hydraulic system) and be designed to take account of direct stresses induced by torsion, vibration and physical damage.

A.1.2 The hydraulics components shall meet the following requirements.

- a) For outer cylinders, the dimensions shall be calculated in accordance with JIS B 8361. If the calculations are made using only the static pressure (fluid pressure actuating on parallel surface to fluid line), it shall be assumed that the calculated pressure will be 1.8 times the actual static pressure.
- b) For rigid pipes and fittings, the dimension shall be calculated in accordance with JIS B 8361. If the calculations are made using only the static pressure, it shall be assumed that the calculated pressure will be 2 times the actual static pressure.
- c) Flexible hoses shall be manufactured in accordance with the requirements of JIS B 8360 or JIS B 8364.

A.1.3 A non-return valve (a valve which is allowed to flow in only one direction and prevents the opposite flow) shall be fitted to allow the hoist to hold the permissible load at any point when the supply pressure drops below the minimum operating pressure (the minimum pressure ensuring actuation of devices).

A.1.4 The non-return valve shall be capable of closing by the jack-side hydraulic pressure and at least one guide spring or gravity.

A.1.5 A pressure relief valve (a pressure control valve by relieving some part of or all fluids to maintain pressure in circuit) shall be fitted, which is adjusted to limit the pressure to 1.5 times the operating pressure (a pressure when equipment or system is actually operated). The relieved hydraulic fluid shall be returned to the reservoir.

A.1.6 The hydraulic system shall be capable of exhausting air (air bleeding).

A.1.7 For powered hydraulic systems, means shall be provided to easily check the level of the hydraulic fluid in the reservoir.

#### A.2 Pneumatic components

A.2.1 In addition to the requirements stated in clause A.1, the following shall apply.

**A.2.2** Pneumatic actuators (including hoses, pipes, connectors and other components on the pressure side) shall be taken account so as to withstand all loads occurring through pressure in accordance with JIS B 8370.

**A.2.3** Safety valves shall be allowed to adjust up to 1.5 times the static pressure caused by the application of maximum load. The safety valve shall be protected against adjustment by unauthorized personnel.

## Annex B (informative)

### Periodic inspection

#### Introduction

This Annex (informative) is to describe the matters related to the periodic inspection and not to constitute the provisions of this Standard.

**B.1** Periodic inspection of the hoist should be undertaken at the time intervals stated by the manufacturer, but at least once a year. The periodic inspection is visually carried out. Particularly, for the hoist's load bearing construction, the hoist with brakes and lifting mechanism including control unit, safety device and body-support unit, function tests and maintenance measures such as adjustment of brakes and tightening of fasteners should be carried out. Every inspection should include a working load test of one lifting cycle with the maximum load.

**B.2** Periodic inspection should be performed by a person who is suitably and properly qualified and well acquainted with the design, use and care of the hoist. The scope of the periodic inspection should be included in the manual supplied with the hoist.

**B.3** Any significant observations for safety of the hoist should be noted, preferably in a logbook, which should be retained by the person(s) responsible for the servicing/maintenance of the hoist. The date when corrective actions are taken, in response to the noted observations, should also be noted in the logbook.

**B.4** A record of the inspection date of hoist and the inspection result should be noted in the logbook together with the signature of the inspector. The detachable rigid body-support units inspected visually should be plainly marked for identification and noted in the logbook. The record should include the situation of use such as home or type of institution.

**B.5** If periodic inspection reveals any defect, wear or other damage that jeopardizes the safety of the hoist, the owner should immediately be notified. In the event of immediate danger to safety, the hoist should immediately be taken out of service. It may then not be used until the deficiency has been eliminated.

**B.6** When serious defects and damages to the safety have occurred in the hoists between two periodic inspections and any corrective actions have already taken, these defects and damages should be entered in the logbook.

**B.7** Defects and damages should be reported back to the manufacturer for action. This feedback should be reported in the logbook.

## Annex C (informative)

### Applications of hoists

#### Introduction

This Annex (informative) is to describe applications of hoists and not to constitute the provisions of this Standard.

This Annex shows some examples of typical applications of hoists. It represents the state of the art at the time of drafting.

When the hoists are used as follows, the given guidance will be based on the principles of avoiding undue stress of the attendant and the lifted person.

Examples of typical applications

- Use in conjunction with a wheelchair
- Use in conjunction with a bathtub
- Use in conjunction with a bed
- Use in conjunction with a shower seat
- Use in conjunction with a toilet
- Lifting from the floor
- Use in conjunction with other technical aids

**Annex JA (informative)**  
**Comparison table between JIS and corresponding International Standard**

JIS T 9241-2 : 2008 <i>Hoists for the transfer of persons with disabilities—Part 2: Mobile hoist</i>					ISO 10535 : 1998 <i>Hoists for the transfer of disabled persons—Requirements and test methods</i>		
(I) Requirements in JIS		(II) International Standard number	(III) Requirements in International Standard		(IV) Classification and details of technical deviation between JIS and the International Standard by clause		(V) Justification for the technical deviation and future measures
Clause	Content		Clause	Content	Classification by clause	Details of technical deviation	
1 Scope	Specifies the design, appearance, construction and performance, etc. of mobile hoists.	ISO 10535	1	Specifies general requirements of hoists and body-support units supporting the transfer of disabled persons.	Deletion	Divides one International Standard into parts 2 to 5 in JIS.	Divides into parts 2 to 5 in consideration of convenience of users of standards. No substantial deviations.
2 Normative references							
3 Terms and definitions	Adds the matters relating to mobile hoists.		3	Definitions of terms	Addition	Describes the terms referred in JIS.	No substantial deviations.
4 Classification and division							
4.1 Classification	Divides by classification of hoists and body-support unit (quotes JIS T 9241-1).		—		Addition	Specifies in detail according to intended purpose.	

(I) Requirements in JIS		(II) International Standard number	(III) Requirements in International Standard		(IV) Classification and details of technical deviation between JIS and the International Standard by clause		(V) Justification for the technical deviation and future measures
Clause	Content		Clause	Content	Classification by clause	Details of technical deviation	
4.2 Division (symbol for division) according to maximum load	Divides by the maximum permissible load of hoists (quotes <b>JIS T 9241-1</b> ).		—	The maximum load of 120 kg or more	Addition	Conforms to physical size of Japanese people.	Proposal will be submitted to ISO in the future.
5 Design, appearance and construction 5.1 Design 5.1.1 Risk analysis	Indirectly quotes the following standard by quoting <b>JIS T 9241-1</b> . <i>JIS Z 8051 Safety aspects—Guidelines for their inclusion in standards</i>		4.1.1	<b>EN 1441</b> <i>Medical devices—Risk analysis</i> Specifies procedures to investigate safety of medical devices by clarification of hazard and evaluation of risk.	Alteration	Adopts well-known method in Japan from risk analysis methods specified in <b>EN 1441</b> .	Specifies in consideration of convenience of users of the Standard. Review will be made when <b>EN 1441</b> is designated as International Standard.
5.1.2 Ergonomics factors	Indirectly specifies required items by quoting <b>JIS T 9241-1</b> .		4.1.2	Specifies <b>EN 614-1</b> <i>Safety of machinery. Ergonomic design principles—Part 1: Terminology and general principles</i> .	Alteration	No substantial deviations.	Specifies in consideration of convenience of users of the Standard. For quotation of <b>ISO/IEC Guide 51</b> , proposal will be submitted to JIS.
5.2 Appearance	Specifies relating to painting.				Addition	Specifies relating to painting as appearance.	No essential deviations.
5.3 j)	Requires emergency lowering device.				Addition	Adds the same provision as that for stationary hoists.	Specifies in consideration of safety of users.

( I ) Requirements in JIS		( II ) International Standard number	( III ) Requirements in International Standard		( IV ) Classification and details of technical deviation between JIS and the International Standard by clause		( V ) Justification for the technical deviation and future measures
Clause	Content		Clause	Content	Classification by clause	Details of technical deviation	
5.3 Construction o) and p)	Specifies relating to spreader bar.		7	It is specified in clause 7 of ISO 10535.	Alteration	Alteration of component	No substantial deviations.
6.1 General requirements a) and b)	Quotes JIS C 9730-1 for electrical safety and electromagnetic compatibility.		8.2.1	Quotes EN 1021-1 and EN 1021-2.	Alteration	Quotation of EN makes it hard to use this ISO standard in every country. So, quotes IEC (JIS) that is equivalent to EN.	Proposal will be submitted for quotation of IEC 60730-1 <i>Automatic electrical controls for household and similar use</i> .
7.2.7 Test methods for immobilizing device (brakes)	Tests on a slope with 1° or over inclination.		4.1.3	Tests on a slope with 1° inclination.	Alteration	Allowance is considered because it is difficult to precisely set 1° inclination.	Specifies in consideration of convenience of users of the Standard. No substantial deviations.
7.2.9 Test methods for sound level	Specifies the use of the sound level meter specified in JIS C 1509-1 and the position of measurement.		4.1.3	ISO 3741:1988 <i>Acoustics— Determination of sound power levels of noise sources— Precision methods for broad band sources in reverberation rooms</i>	Alteration	Adopts practical methods.	Specifies in consideration of convenience of users of the Standard. No essential deviation.
			4.2.2.6	ISO 3744:1988 <i>Acoustics— Determination of sound power levels of noise source— Methods for free field conditions over a reflecting plane</i>			

(I) Requirements in JIS		(II) International Standard number	(III) Requirements in International Standard		(IV) Classification and details of technical deviation between JIS and the International Standard by clause		(V) Justification for the technical deviation and future measures
Clause	Content		Clause	Content	Classification by clause	Details of technical deviation	
7.2.1 General requirements c)	Specifies the requirements for CSP.		7	Deletes contents on spreader bar and sling from clause 7 of ISO 10535.	Deletion	For construction, specifies in 5.3. For slings, prepares specific JISs.	Divides into parts 2 to 5 in consideration of convenience of users of the Standard. Any countermeasures are not required.
8 Inspection			—		Addition	Specifies in detail.	
9 Marking and instruction for use 9.1 Marking			4.11.1	EN 980 <i>Graphic symbols for the use in the labelling of medical devices.</i>	Alteration	Quotation of EN in EN 980 as well as quotation of EN 980 makes it hard to use this ISO standard in every country.	Clearly specifies marking items. Any countermeasures are not required.
9.1 b) c) d)	Division symbol by the maximum load				Addition	Describes according to division by body weight.	No substantial deviations.
9.1 h)	Maximum load				Addition	Stipulates weight range of user.	Proposal will be submitted to ISO.
9.2 k)	Recommends to refer to instruction for use of sling.				Addition		Clearly specifies designation matters. Any countermeasures are not required.
—			6	Stationary hoists	Deletion	Prepares specific JIS individually.	Divides into parts 2 to 5 in consideration of convenience of users of the Standard. Any countermeasures are not required.
—			8	Rigid body support unit	Deletion	Preparation will be made individually in the future.	



( I ) Requirements in JIS		(II) Inter- national Standard number	(III) Requirements in Interna- tional Standard		(IV) Classification and details of technical deviation between JIS and the International Standard by clause		(V) Justification for the technical deviation and future measures
Clause	Content		Clause	Content	Classification by clause	Details of technical deviation	
Annex A (normative)	Hydraulic and pneumatic com- ponents— requirements		Annex C			—	
A.1.2	JIS B 8361		C.1.2	DIN 2413 <i>Steel pipes Part 1 : Design of steel pressure steel pipes</i>	Alteration	In order to ensure the following matters, JIS B 8361 specifies as guidelines for manu- factures and purchas- ers. a) Safety b) System operation without failure and trouble c) Easy and eco- nomical mainte- nance d) Long-life system DIN 2413 is a standard relating to design.	ISO 10535 quotes DIN 2413 and DIN 2413 quotes DIN. These quo- tations make it hard to use this ISO standard in every country. Therefore, proposal will be submitted to ISO in the future for quotation of ISO 4413 that is iden- tical with JIS B 8361.
A.2.2	JIS B 8370		C.3.2	No quoting Standards.	Alteration	Quotes JIS B 8370.	No substantial deviations.
-----			Annex ZZ	International Stan- dard and European Standard for informa- tion	Deletion	Describes in this An- nex.	Any countermeasures are not required because of description in this Annex.

Overall degree of correspondence between **JIS** and International Standard (ISO 10535 : 1998) : MOD

NOTE 1 Symbols in sub-columns of classification by clause in the above table indicate as follows:

- Deletion : Deletes specification item(s) or content(s) of International Standard.
- Addition : Adds the specification item(s) or content(s) which are not included in International Standard.
- Alteration : Alters the specification content(s) which are included in International Standard.

NOTE 2 Symbol in column of overall degree of correspondence between **JIS** and International Standard in the above table indicates as follows:

- MOD : Modifies International Standard.

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